

Sex estimation using post-mortem computed tomographic images of the clavicle in a Malaysian population

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ABSTRACT

Introduction: Forensic practitioners need contemporary anthropological data for the identification of human remains. The clavicle possesses a high degree of variability in its anatomical, biomechanical, and morphological features that are sex-dependent albeit population specific. The aim of this study was to develop sex estimation models for Malaysian individuals using post-mortem computed tomographic images of the clavicle. **Materials and Methods:** Sample comprised scans of 2.0 mm resolution of 405 individuals (209 male; 196 female) aged between 19 to 88 years. These scans were reconstructed and visualized using Infinit. Six clavicular measurements (i.e. maximum length, C1; midshaft circumference, C2; midshaft maximum diameter, C3; midshaft minimum diameter, C4; maximum breadth of the sternal end, C5; and maximum breadth of the acromial articular surface, C6) were obtained from these images. Data were analysed using descriptive statistics and discriminant function analysis. Measurements taken from the images were highly precise (ICC = 0.770-0.999). **Results:** There is a significant difference between all parameters and sex ($p < 0.001$), however none for age and ethnic group. A multivariate sex estimation model was developed: $\text{Sex} = (C1 \times 0.86) + (C2 \times 0.236) + (C3 \times -0.145) + (C5 \times -0.074) - 17.618$; with an accuracy rate of 89.1% and sex bias of -3.2%. Lower accuracy rates were obtained for single variable models (61.5-83.2%). **Conclusion:** The resultant sex discriminant models can be used for estimating sex based on the clavicle in our local forensic practice.